CLAIMS:

1. A gas mixing supply device comprising:

a mixing system configured to supply a supply gas, in which a plurality of types of gases are mixed, to a tank;

a supply system configured to supply the supply gas stored in the tank to a gas-based apparatus; and

a controller configured to control driving of the mixing system, the tank, and the supply system,

wherein the mixing system includes a mixing gas supply line that allows the supply gas to flow to the tank, a first vent line and a second vent line branched off from the mixing gas supply line and connected to an external unit, a mixing gas concentration analysis unit configured to measure a concentration of the supply gas flowing from the mixing gas supply line to the second vent line, and a mixing gas pressure measurement unit configured to measure a pressure of the supply gas flowing from the mixing gas supply line to the second vent line, and

wherein the controller controls the supply gas flowing through the mixing gas supply line to flow to one of the tank and the first vent line by comparing the concentration of the supply gas measured by the mixing gas concentration analysis unit with a preset reference concentration range and by comparing the pressure of the supply gas measured by the mixing gas pressure measurement unit with an internal pressure of the tank.

2. The gas mixing supply device of claim 1, wherein the mixing system includes a mixing gas supply line valve configured to open or close the mixing gas

supply line, and a first vent line valve configured to open or close the first vent line,

wherein the controller opens the mixing gas supply line valve and closes the first vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit satisfies the reference concentration range and the pressure of the supply gas measured by the mixing gas pressure measurement unit is higher than or equal to a gas pressure inside the tank, and

wherein the controller closes the mixing gas supply line valve and opens the first vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit does not satisfy the reference concentration range or when the pressure of the supply gas measured by the mixing gas pressure measurement unit is lower than the gas pressure inside the tank.

3. The gas mixing supply device of claim 1, wherein the mixing system includes a second vent line valve configured to open or close the second vent line, and

wherein the controller controls driving of the second vent line valve to control whether to supply the supply gas to the second vent line so as to control whether to measure the concentration and the pressure of the supply gas.

4. The gas mixing supply device of claim 1, wherein the second vent line has a cross-sectional area that is smaller than that of the first vent line.

5. The gas mixing supply device of claim 1, wherein the mixing system further includes a mixing gas vent mass flow controller configured to adjust an opening degree of the first vent line to adjust a discharge amount of the supply gas

discharged through the first vent line.

6. The gas mixing supply device of claim 1, wherein the mixing system further includes a plurality of source gas supply lines and a mixing unit in which a plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form the supply gas, wherein the plurality of different types of source gases are each supplied to one of the plurality of source gas supply lines, and

wherein the mixing gas supply line connects the mixing unit and the tank.

7. The gas mixing supply device of claim 1, wherein the supply system includes a tank gas supply line connecting the tank and the gas-based apparatus and a tank gas concentration analysis unit configured to measure the concentration of the supply gas flowing through the tank gas supply line, and

wherein the controller determines whether the supply gas supplied to the gas-based apparatus is appropriate by comparing the concentration of the supply gas measured by the tank gas concentration analysis unit with the preset reference concentration range.

8. The gas mixing supply device of claim 1, wherein the supply system includes a tank gas supply line valve configured to open or close the tank gas supply line, and

wherein the controller opens the tank gas supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller closes the tank gas

supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

9. The gas mixing supply device of claim 1, wherein the supply system includes a tank gas vent line branched off from the tank gas supply line and connected to an external unit and a tank gas vent line valve configured to open or close the tank gas vent line, and

wherein the controller closes the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller opens the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

10. The gas mixing supply device of claim 6, wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, the controller calculates a concentration correction value so that the concentration of the supply gas flowing through the tank gas supply line satisfies the reference concentration range, and then the controller corrects the concentration of the supply gas supplied to the tank through the mixing system by applying the concentration correction value to the mixing system.

11. The gas mixing supply device of claim 10, wherein the plurality of source gas supply lines include at least one pressure relief valve configured to adjust supply pressures of the plurality of different types of source gases and at least one

mass flow controller configured to adjust supply flow rates of the plurality of different types of source gases, and

wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, the controller adjusts the pressure relief valve and the mass flow controller according to the concentration correction value to adjust a ratio of each of the source gases mixed in the mixing unit so as to correct the concentration of the supply gas supplied to the tank through the mixing gas supply line.

12. The gas mixing supply device of claim 1, wherein the mixing system, the tank, and the supply system are modular devices that are formed as independent separate devices but coupled to each other.

13. A mixing system comprising:

a plurality of source gas supply lines and a mixing unit in which a plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form a supply gas, wherein the plurality of different types of source gases are each supplied to one of the plurality of source gas supply lines,

a mixing gas supply line allowing the supply gas to flow to a tank;

a first vent line branched off from the mixing gas supply line and connected to an external unit;

a second vent line branched off from the mixing gas supply line and connected to an external unit;

a mixing gas concentration analysis unit configured to measure a concentration of the supply gas flowing from the mixing gas supply line to the

second vent line;

a mixing gas pressure measurement unit configured to measure a pressure of the supply gas flowing from the mixing gas supply line to the second vent line; and

a controller configured to control the supply gas flowing through the mixing gas supply line to flow to one of the tank and the first vent line by comparing the concentration of the supply gas measured by the mixing gas concentration analysis unit with a preset reference concentration range and by comparing the pressure of the supply gas measured by the mixing gas pressure measurement unit with an internal pressure of the tank.

14. The mixing system of claim 13, further comprising a mixing gas supply line valve configured to open or close the mixing gas supply line and a first vent line valve configured to open or close the first vent line,

wherein the controller opens the mixing gas supply line valve and closes the first vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit satisfies the reference concentration range, and the controller closes the mixing gas supply line valve and opens the first vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit does not satisfy the reference concentration range.

15. The mixing system of claim 13, further comprising a mixing gas valve configured to open or close the mixing gas supply line and a first vent line valve configured to open or close the first vent line,

wherein the controller opens the mixing gas supply line valve and closes the first vent line valve when the pressure of the supply gas measured by the mixing gas

pressure measurement unit is larger than or equal to a gas pressure inside the tank, and the controller closes the mixing gas supply line valve and opens the first vent line valve when the pressure of the supply gas measured by the mixing gas pressure measurement unit is smaller than the gas pressure inside the tank.

16. The mixing system of claim 15, further comprising a second vent line valve configured to open or close the second vent line,

wherein the controller controls driving of the second vent line valve to control whether to measure the concentration and the pressure of the supply gas through the mixing gas concentration analysis unit and the mixing gas pressure measurement unit.

17. The mixing system of claim 15, wherein the second vent line has a cross-sectional area that is smaller than that of the first vent line.

18. The mixing system of claim 15, further comprising a mixing gas vent mass flow controller configured to adjust an opening degree of the first vent line so as to adjust a discharge amount of the supply gas discharged through the first vent line.

19. The mixing system of claim 15, further comprising a plurality of source gas supply lines and a mixing unit in which a plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form the supply gas, wherein the plurality of different types of source gases are each supplied to one of the plurality of source gas supply lines,

wherein the mixing gas supply line is configured to connect the mixing unit and the tank.

20. The mixing system of claim 19, wherein the supply gas stored in the tank is supplied to a gas-based apparatus through a supply system, and the supply system includes a tank gas concentration analysis unit configured to measure the concentration of the supply gas flowing from the tank to the gas-based apparatus,

wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, a concentration correction value calculated so that the concentration of the supply gas flowing through the tank gas supply line satisfies the reference concentration range is transferred from the supply system to the controller, and

wherein the controller adjusts the pressure relief valve and the mass flow controller according to the concentration correction value to adjust a ratio of each of the source gases mixed in the mixing unit so as to correct the concentration of the supply gas supplied to the tank through the mixing gas supply line.

21. A gas mixing supply method using a mixing system in which a plurality of types of gases are mixed in a mixing unit to form a supply gas and then the supply gas is supplied to and stored in a tank through a mixing gas supply line, the method comprising the steps of:

a) measuring a concentration and a pressure of the supply gas flowing from the mixing gas supply line to a second vent line by allowing the supply gas to flow to the second vent line branched off from the mixing gas supply line, connected to an external unit, and including a mixing gas concentration analysis unit configured to

measure the concentration of the supply gas and a mixing gas pressure measurement unit configured to measure the pressure of the supply gas; and

b) controlling, by a controller, the supply gas flowing through the mixing gas supply line to flow to the tank and the first vent line by comparing the concentration of the supply gas measured by the mixing gas concentration analysis unit with a preset reference concentration range and by comparing the pressure of the supply gas measured by the mixing gas pressure measurement unit with an internal pressure of the tank.

22. The gas mixing supply method of claim 21, wherein in step b), the controller opens a mixing gas supply line valve configured to open or close the mixing gas supply line and closes a first vent line valve configured to open or close the first vent line when the concentration of the supply gas measured by the mixing gas concentration analysis unit satisfies the reference concentration and the pressure of the supply gas measured by the mixing gas pressure measurement unit is larger than or equal to a gas pressure inside the tank, and the controller closes the mixing gas supply line valve and opens the first vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit does not satisfy the reference concentration or when the pressure of the supply gas measured by the mixing gas pressure measurement unit is smaller than the gas pressure inside the tank.

23. The gas mixing supply method of claim 21, wherein in step b), the controller controls driving of a second vent line valve configured to open or close the second vent line to control whether to supply the supply gas to the second vent line

so as to control driving of the mixing gas concentration analysis unit and the mixing gas pressure measurement unit.

24. The gas mixing supply method of claim 21, wherein in step b), when a first vent line valve for opening and closing the first vent line is opened by the control unit to discharge the supply gas to the outside through the first vent line, the controller adjusts a mixing gas vent mass flow controller configured to adjust an opening degree of the first vent line to adjust a discharge amount of the supply gas discharged through the first vent line.

25. The gas mixing supply method of claim 21, further comprising the steps of:

c) measuring the concentration of the supply gas flowing through a tank gas supply line connecting the tank and a gas-based apparatus, by a tank gas concentration analysis unit of a supply system configured to supply the supply gas stored in the tank to the gas-based apparatus; and

d) determining, by the controller, whether the supply gas supplied to the gas-based apparatus is appropriate by comparing the concentration of the supply gas measured by the tank gas concentration analysis unit with the preset reference concentration range.

26. The gas mixing supply method of claim 25, wherein in step d), the controller opens a tank gas supply line valve configured to open or close the tank gas supply line when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the

controller closes the tank gas supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

27. The gas mixing supply method of claim 25, wherein in step d), the controller closes a tank gas vent line valve configured to open or close a tank gas vent line branched off from the tank gas supply line and connected to an external unit when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller opens the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

28. The gas mixing supply method of claim 25, wherein in step d), when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, the controller calculates a concentration correction value so that the concentration of the supply gas flowing through the tank gas supply line satisfies the reference concentration range, and then the controller corrects the concentration of the supply gas supplied to the tank through the mixing system by applying the concentration correction value to the mixing system.

29. The gas mixing supply method of claim 28, wherein the mixing system further includes a plurality of source gas supply lines through which a plurality of different types of source gases are supplied to the mixing unit,

wherein the plurality of source gas supply lines include at least one pressure relief valve configured to adjust supply pressures of the plurality of different types of source gases and at least one mass flow controller configured to adjust supply flow rates of the plurality of different types of the source gases, and

wherein in step d), when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy a preset reference concentration range, the controller adjusts the pressure relief valve and the mass flow controller according to the concentration correction valve to adjust a ratio of each of the source gases mixed in the mixing unit so as to correct the concentration of the supply gas supplied to the tank through the mixing gas supply line.

30. The gas mixing supply method of claim 25, wherein the supply system further includes a tank gas concentration analysis line branched off from the tank gas supply line and a tank gas concentration analysis line valve configured to open or close the tank gas concentration analysis line,

wherein the tank gas concentration analysis unit measures the concentration of the supply gas flowing through the tank gas concentration analysis line, and

wherein step c) is a step in which the controller opens the tank gas concentration analysis line valve, and thus the tank gas concentration analysis unit measures the concentration of the supply gas flowing from an inside of the tank via the tank gas supply line to the tank gas concentration analysis line.